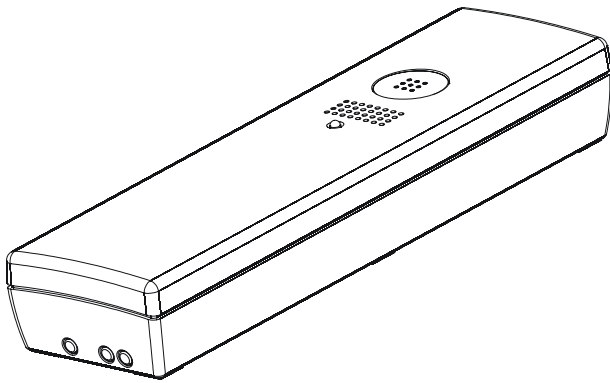


SIEMENS



FDCW221

Radio gateway

Technical manual

Building Technologies

Fire Safety & Security Systems

Technical specifications and availability subject to change without notice.

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1 About this document

Goal and purpose

This document describes the radio gateway FDCW221 as well as the integration of the radio detectors DOW1171 and SMF6120 into the fire detection system. It contains all information on the setup and functions as well as project planning, installation and commissioning.

Target audience

The information in this document is intended for the following target groups.

Target audience	Activity	Qualification
Product Manager (PM)	<ul style="list-style-type: none"> – Performs local product management. – Is responsible for the exchange of information between the headquarters and his RC for his products. 	<ul style="list-style-type: none"> – Has suitable specialist training for the function and for the product range. – Has attended the PM training courses.
Project Manager	<ul style="list-style-type: none"> – The Project Manager is responsible for the local project management. Coordinates the use of all persons and resources involved in the project according to schedule. – Continuously supplies information necessary for project realization. 	<ul style="list-style-type: none"> – Has suitable specialist training for the function, project scale and product range. – Has attended the Project Manager training courses.
Installer	<ul style="list-style-type: none"> – Assembles and installs the components at the place of installation. – Performs a subsequent check of the installation. 	<ul style="list-style-type: none"> – The personnel have received specialist training in the area of building installation technology or electrical installations.
Commissioning personnel	<ul style="list-style-type: none"> – Configure the product at the place of installation according to customer-specific requirements. – Check the product operability and release the product for use by the operator. – Search for and correct malfunctions. 	<ul style="list-style-type: none"> – Has suitable specialist training for the function and for the product range. – Have attended the training courses for commissioning personnel.
Maintenance personnel	<ul style="list-style-type: none"> – Carry out all maintenance work and check for correct functioning. 	<ul style="list-style-type: none"> – Has suitable specialist training for the function and for the product range.

Reference documents

Number	Document title
009866	FDCW221 Radio gateway, Installation instructions
1787	DCW1151, DOW1171 Wireless radio detection system
007564	SIGMASPACE Manual call point with radio base SMF6120
004446	DZW1171 Radio test set, Operating instructions
005677	Sigmaspace RadioSpy, User manual
007227	FDUD292 Detector exchanger and tester
009718	FDUD293 Intelligent detector tester
008331	List of compatibility
009052	FS20 Fire detection system

Conventions for text marking

→	Result
'Text'	exact concordance

Technical terms

Term	Explanation
AI	Alarm indicator
dB	Decibel: Logarithmic relation of two levels.
DOW1171	Radio smoke detector
DZW1171	Radio test set
EMC	Electromagnetic compatibility
ERP	Effective Radiated Power
FDnet	Addressed detector line
FDUD29x	Detector exchanger and tester. Test device for different types of fire detectors.
FDUZ221	MCL-USB adapter. Protocol converter from USB to MC-Link.
Radio detector	Devices that can communicate with the radio gateway via a radio circuit.
Radio cell	Radio range, e.g. coverage area of gateway
Gateway	Network bridge connecting two different systems or networks.
LED	Light-emitting diode
MC-Link	Maintenance and Commissioning Link
RadioSpy	Test device to observe, monitor and configure a radio detector cell.
SMF6120	Manual call point with radio base
SPU60xx	Radio module
SRD band	Reserved frequency band with defined user rules (Short Range Device Band)
USB	Universal Serial Bus
VDC	Direct Current

Document identification

Location	Meaning
Title page	<ul style="list-style-type: none"> – Short name – Name in full – Document purpose
Last page, bottom left-hand side	<ul style="list-style-type: none"> – Document no. (number-modification index-language-COUNTRY) – Date of issue
Last page, bottom right-hand side	<ul style="list-style-type: none"> – User's guide – Index

Download

You can find the current version of the documentation on our intranet.

Revision history

Document no.	Edition date	Brief description
009865_b_en_--	11.2007	Chap. 'Interior view': Port for MC-Link (general)
009865_a_en_--	07.2007	First edition

2 Safety notes

This chapter describes the danger levels and the relevant safety regulations applicable for the use of the products from Siemens Building Technologies. Please read the work instructions as well as the chapter 'About this document' before beginning any work.

2.1 Signal words and symbols

2.1.1 Classification and meaning of signal words

The danger situation - that is, the severity and probability of danger - is indicated by the signal words listed below. Non-observance may lead to the consequences indicated:

DANGER!	Imminent danger! ● May cause danger to life or serious bodily injury!
Warning!	Dangerous situation! ● May cause serious bodily harm.
Caution!	May cause dangerous situations! ● May cause light injuries!
Note!	Possibly harmful situation! ● May cause damage to the product or to objects in the immediate vicinity of the product!

2.1.2 Symbols and their meaning

The symbols listed below indicate the nature and origin of the danger.



DANGER	General danger
---------------	----------------



DANGER	Electrical voltage
---------------	--------------------

Example for an indication of danger

The example below illustrates the appearance and form of danger warnings in our documents.



DANGER	External voltage Disconnect the module from the power supply.
---------------	--

2.1.3 Classification and meaning of additional symbols



Tips and information



Refers to extremely important or critical decisions to be taken into account before continuing the work.

2.2 Safety-relevant working instructions

Country-specific standards

The products are developed and produced in compliance with the relevant international and European safety standards. Should additional country-specific, local safety standards or regulations concerning project planning, installation, operation and disposal of the product apply in the place of operation, then these standards or regulations must also be taken into account in addition to the safety regulations mentioned in the product documentation.

Electrical installations



DANGER

Work on electrical installations

Work on electrical installations may only be carried out by qualified electricians or by instructed persons working under the guidance and supervision of a qualified electrician, in accordance with the electrotechnical regulations.

Assembly, installation, commissioning and inspection work

- If any tools or accessories such as ladders are required, safe and suitable devices must be used.
- When fire controls are activated for test purposes, any damage to system parts must be ruled out.
- Fire control installations must only be activated after the test has been completed and the system has been definitely handed over to the customer.
- Third party systems or devices must only be activated in the presence of the responsible person.

Modifications to the system design and the products

Modifications to a system or to individual products may cause faults or malfunctioning. Please request written approval from us and the relevant authorities concerning in-tended system modifications and system extensions.

Modules and spare parts

Locally procured modules and spare parts must comply with the technical specifications laid down by the manufacturer. This compliance is always ensured for original spare parts supplied by us.

3 Features

With the radio gateway it is possible to monitor signals emitted by radio detectors and to send them to a fire control panel via the FDnet.

The radio gateway is operated on the FDnet. The term "Radio detectors" comprises all devices that can be monitored by the radio gateway.

The radio gateway FDCW221 may communicate with the following radio detectors:

- Radio smoke detector DOW1171
- Manual call point with radio base SMF6120

A radio cell is made up of a radio gateway and the radio detectors registered on it.

The following figure shows how the radio gateway is integrated into the fire detection system via the FDnet.

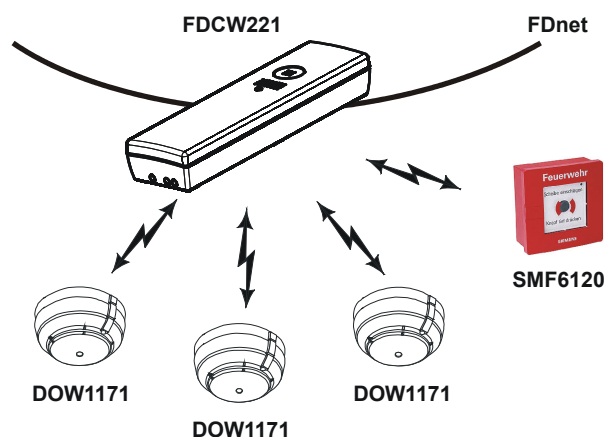


Fig. 1 Radio gateway on the FDnet with radio detectors

Features

- compatible with the fire detection system FS20
- simultaneous operation of wired fire detectors on the FDnet and wireless radio detectors on the radio gateway is possible
- high transmission reliability
 - automatic definition of the optimum basic and secondary radio channels
 - automatic change of channels in case of radio interferences
- Individual addressing for easy identification of the location
- up to 16 radio gateways with radio cell monitoring function can be operated
- up to 30 radio detectors can be connected to one radio gateway
- 2 external alarm indicators can be connected to the radio gateway
- low current consumption; battery change only required after 5 years

Applications

- For rooms with great historical significance or a high value concentration, e.g. museums, churches, libraries.
- For rooms where cabling is unwanted for aesthetic reasons.
- For rooms in which reconstruction work is permanently or regularly carried out, e.g. exhibition halls.

4 Setup

4.1 Overall view

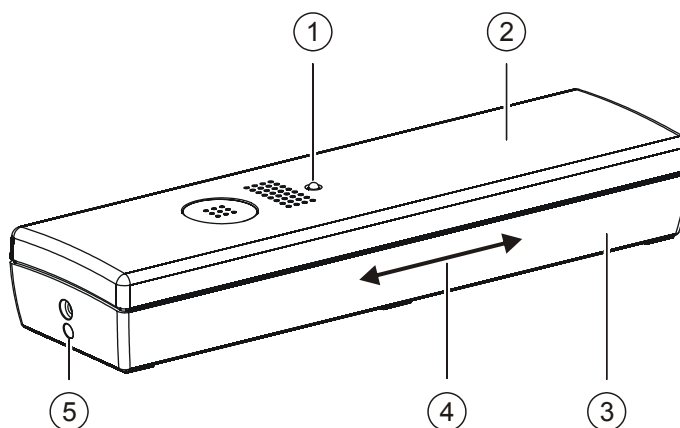


Fig. 2 Overall view

Legend

- 1 LED red/green
- 2 Housing cover
- 3 Housing bottom
- 4 Magnet movement for reed contact
- 5 Unlocking of housing cover

4.2 Interior view

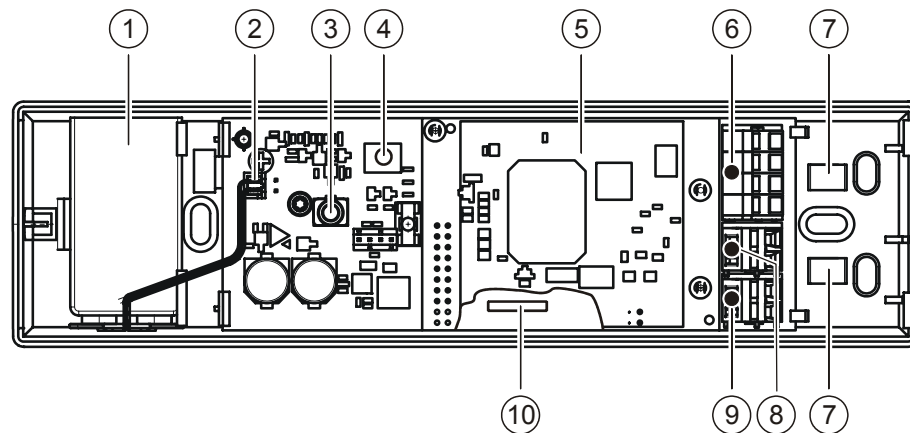


Fig. 3 Interior view

Legend

- 1 9 V battery with clip
- 2 Connection of the battery cable
- 3 Port for MC-Link
- 4 Button for settings
- 5 Radio module
- 6 Spring clips 'LINE' for the FDnet detector line
- 7 Retainers for the cable strain relief by means of cable ties
- 8 Shield connection terminal blocks 'SHIELD' for the detector line cables
- 9 Spring clips for the external alarm indicator
- 10 Reed contact

4.3 Connections

The radio gateway FDCW221 has connections for the FDnet detector line, external alarm indicators and for the shieldings of the detector line cables. The two connection terminals 'SHIELD' are internally connected to each other.

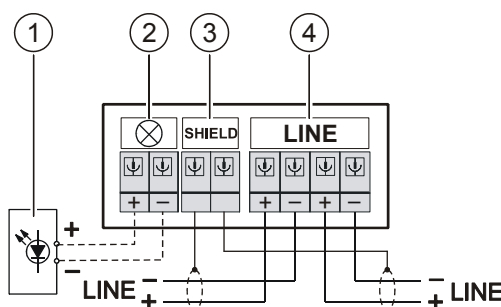


Fig. 4 Connections

Legend

- 1 External alarm indicator
- 2 Spring clips for external alarm indicators
- 3 Shield connection terminal blocks for the detector line cables
- 4 Spring clips for the FDnet detector line

4.4 Scope of delivery

The radio gateway is delivered with the following accessories:

- 1x line battery connection (with 9 V battery clip and p.c.b. connector)
- 2x cable ties (3.7 x 208 mm) for the strain relief of the cables



Batteries are not included in the scope of delivery. For the commissioning of the radio gateway a battery is always required.

4.5 Accessories

The following accessories for the radio gateway FDCW221 are available:

Details for ordering			Application
9V lithium battery	A5Q00004142	9V lithium battery	Support battery
DBZ1190-AA	4677080001	Micro terminal 0.28 ... 0.5 mm ²	If more than one wire must be connected to the p.c.b. for each spring clip, e.g. cable shield from ext. alarm indicator.
DBZ1190-AB	4942340001	Connection terminal 1 ... 2.5 mm ²	If more than one wire must be connected to the p.c.b. for each spring clip, e.g. cable shield from ext. alarm indicator.
DZW1171	5762200001	Radio test set	For the measurement of the field strength in buildings.
FDUZ221	A5Q00020131	MCL-USB adapter	Interface converter for firmware updates on PC.
RadioSpy	S24218-F65-A1	Sigmaspace RadioSpy	To observe, monitor or configure a radio cell.

The following accessories are available for the radio smoke detector DOW1171:

Details for ordering			Application
9V lithium battery	A5Q00004142	9V lithium battery	2 batteries are required for the power supply of the DOW1171.

The following accessories are available for the manual call point with radio base SMF6120:

Details for ordering			Application
3.6V lithium Mignon battery	V24069-Z112-A1	3.6V lithium Mignon battery with line and connector	2 batteries are required for the power supply of the SMF6120.

4.5.1 RadioSpy

RadioSpy is an optional accessory for the installation of radio cells and for the purpose of analysis in case of problems.

The following components are parts of RadioSpy:

- Software RadioSpy (installation on a PC)
- Hardware RadioSpy (radio module in housing + cable set)

The following functions can be performed with RadioSpy:

- Observing a radio cell (recording and analysis)
- Registering and logging off radio detectors
- Replacing radio detectors or radio gateways

RadioSpy User manual 005677

Order no.: A24205-A337-H897

5 Function

5.1 Overview

The FDCW221 communicates with the control panel via the FDnet detector line. The coverage range of the radio signal is up to 40 m in buildings and strongly depends on materials and equipment.

When radio cells overlap, the maximum number of radio gateways is limited to 16 radio gateways or radio cells, respectively, due to the limited number of channels. Without an overlapping of radio cells, the maximum address connection factor of the FDnet detector line limits the number of connectable devices (radio gateways, detectors).

At maximum 30 radio detectors can be connected to one radio gateway. Each radio detector has its own address. The radio gateway always occupies two addresses.

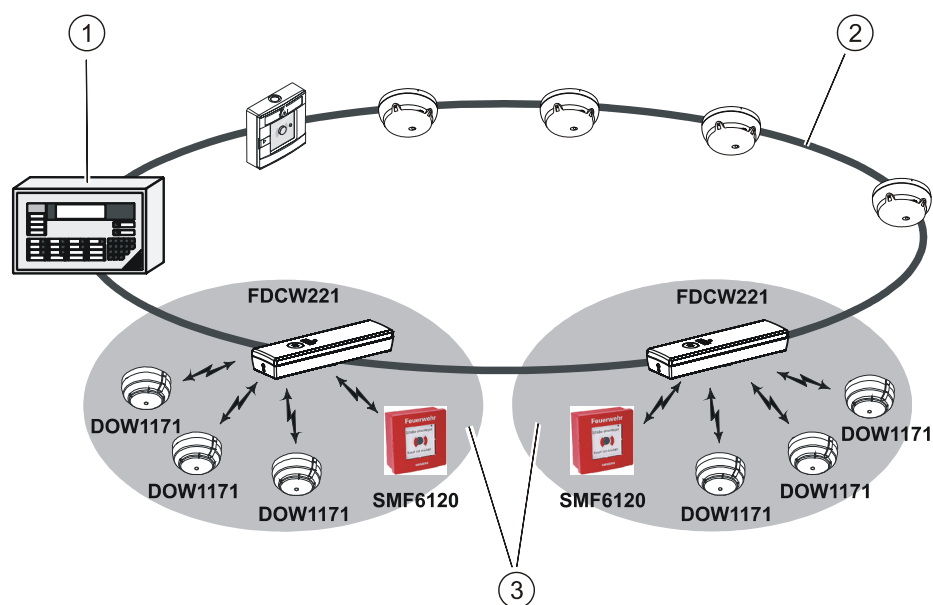


Fig. 5 Two radio cells on the FDnet

Legend

- 1 Control panel
- 2 FDnet detector line
- 3 Radio cells

5.2 Diagnosis levels

The radio gateway largely auto-monitors its functionality.

The following diagnosis levels are derived from the different control measurements:

- Normal
- Exchange recommended
- Exchange required
- Fault

Details see table below.

When a fatal error occurs, which makes the proper function of the radio gateway impossible, a fault message is signalled on the control panel.

To remedy the cause, additional information is available in the radio gateway. This information may be indicated by the detector exchanger and tester FDUD29x (from SW V2.1).

Please also refer to the operation instructions of the detector exchanger and tester, doc. nos. 007227 and 009718.

Indication on the detector exchanger and tester	Meaning	Actions
'No Deviation'	Normal, no fault is present The radio gateway is fully functional	none
'advice excha.' *	Exchange recommended The radio gateway is still functional, in spite of minor problems <ul style="list-style-type: none"> ● FDCW221 <ul style="list-style-type: none"> – Battery voltage too low 	Exchange battery
'needed excha.' *	Exchange required The radio gateway is only fed with power via the detector line <ul style="list-style-type: none"> ● FDCW221 <ul style="list-style-type: none"> – Battery totally discharged or missing 	Exchange or insert battery
Any fault message	Fault is present Alarming is no longer ensured: <ul style="list-style-type: none"> ● FDCW221 <ul style="list-style-type: none"> – Radio cell not configured – Radio module failure 	<ul style="list-style-type: none"> – Configure radio cell – Exchange radio gateway
	Supply error	<ul style="list-style-type: none"> – Check detector line voltage – Exchange radio gateway
	Software error (Watchdog error)	Exchange radio gateway
	Storage error	Exchange radio gateway
	Communication error between the radio gateway and the control panel	Remedy cause

Note

The status 'Any fault message' can be displayed together with another status, e.g. 'needed excha.' (exchange required).

* Indication on the detector exchanger and tester always in English; no translation into the country-specific language.

5.3 Degraded mode in FDnet

When the main processor of the fire control panel fails, the control panel is in degraded mode. Depending on the control panel type, the fire control panel can continue to perform the most important alarming and signalling functions in degraded mode.

Behaviour in degraded mode on control panels supporting degraded operation Alarming is still ensured in degraded mode. However, in degraded mode only collective alarming is possible. This means that in case of alarm, it is possible to identify the detector line in account but not the exact location of the detector triggering alarm.

The degraded operation on the FDnet is not equally supported by all control panels. During project planning, the information in the document 'List of compatibility' (doc. no. 008331) and the control panel documentation in account is mandatory.

5.4 Operation modes

The radio gateway has the following operation modes:

- Normal operation
- Startup mode
- Configuration mode

5.4.1 Normal operation

The radio gateway is in the intended operating mode. All radio detectors in the radio cell are monitored.

5.4.2 Startup mode

As soon as power is supplied to the radio gateway, it goes into startup mode. In startup mode the radio gateway checks whether any radio detectors are registered. If the radio detectors of the radio cell are registered, the radio gateway changes from startup into normal operation. Otherwise, the radio gateway changes directly from startup mode to configuration mode.

see also:

→ 8.2 Putting the radio gateway into operation, Page 33

5.4.3 Configuration mode

In configuration mode the radio connection is established with all radio detectors. The system searches for free radio channels and registers the radio detectors on the radio gateway.

When a radio detector is removed or added, the radio gateway is equally set in configuration mode.

The radio gateway is set in configuration mode by pressing the button on the radio gateway as follows:

- long: to remove a radio detector
- short: to add a radio detector

After at maximum 15 minutes without any manipulation, the radio gateway changes from configuration mode to normal operation.

5.5 Protocols

5.5.1 FDnet

Communication

The communication with the control panel is performed via the FDnet detector line. The configuration is performed from the control panel.

Line separator FDCL221

A line separator is integrated into the radio gateway. In case of a short circuit, it isolates the defective part on the FDnet detector line. This way it is ensured that the faultless line part can continue to communicate with the control unit.

Regarding the topology, the radio detectors registered on the radio gateway are in a stub. The stub branches off the FDnet detector line between the FDCW221 and the integrated line separator FDCL221 of the radio gateway (see figure below).

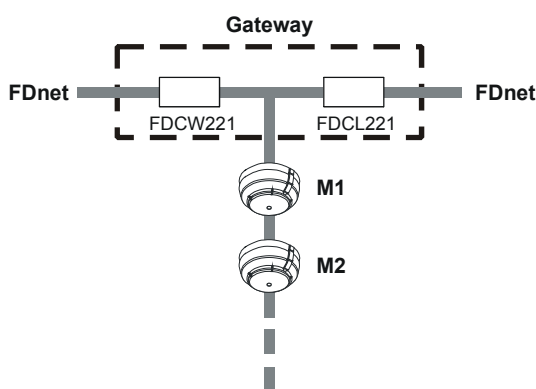


Fig. 6 Topology of the radio gateway on the FDnet

Legend

Gateway	Radio gateway housing
FDnet	FDnet spring clips on the radio gateway
M1	Radio detector 1 on the stub
M2	Radio detector 2 on the stub

5.5.2 MC-Link

The MC-Link connection in the radio gateway primarily serves for the connection of the detector exchanger and tester FDUD29x (from SW V2.1). The detector exchanger and tester makes it possible to extract information from the radio gateway for the purpose of commissioning, maintenance and troubleshooting. In addition, the MC-Link is used to update the firmware of the radio gateway. The firmware is loaded from the PC to the radio gateway by means of the MCL-USB adapter FDUZ221.

5.5.3 Radio transmission

The radio module SPU60xx consists of a p.c.b. with an integrated antenna. The radio module is a component which makes a bi-directional data transmission possible in a frequency range of 868-870 MHz.

The radio module has a complete emitting and receiving unit as well as a microcontroller control for all radio transmission functions.

The radio transmission is in the SRD band (Short Range Device), which is a special frequency band with defined usage rules. The SRD is free from amateur radio activities. This band provides 80 channels with a channel width of 25 kHz.

Properties of the SRD band:

- defined, low maximum transmission performance and duty cycle (emitting/idle period relation)
- Sub-bands for different applications
- High availability

Properties of the radio module:

- The radio transmission realizes the highest detection capability
- 4 alternative channels are assigned to each of the 16 basis channels (5 x 16 = 80 different channels)
 - Any disturbance of the basis channel is immediately realized. If this is the case, the frequency automatically changes channels up to 4 times.
- Communication faults are recognized within at maximum 100 s. Alarms and interruptions of the radio communication are transmitted immediately.

5.6 Reed contact and button

The reed contact is an additional operation element by means of which some of the button functions can be performed when the housing is closed.

In general, it is possible to activate the reed contact instead of the button with a magnet upon commissioning. The reed contact is activated by briefly pressing the button.

The reed contact is activated by slowly (for approx. one second) moving a magnet alongside the reed contact.

see also:

- 4.2 Interior view, Page 12
- Fig. 2 , Page 11
- 5.7 Status indication on the radio gateway, Page 22

5.7 Status indication on the radio gateway

The radio gateway has three internal LED (yellow, red, green) and a red/green LED in the housing cover.

The flashing sequences are indicated in parallel by the 2 green and the 2 red LEDs.



The flashing sequences of the LED inside the radio gateway cannot be indicated by the LED in the housing cover.

The yellow LED only indicates flashing sequences when radio detectors shall be removed.

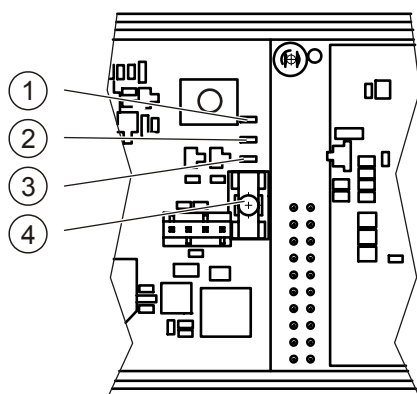


Fig. 7 LEDs

Legend

- 1 Internal LED yellow H3
- 2 Internal LED green H2
- 3 Internal LED red H4
- 4 LED in the housing cover red/green H1

Operating mode	LEDs red H1, H4	LEDs green H1, H2	LED yellow H3	Meaning
Normal operation	off	off	off	Normal, intended operation
Startup mode	flashing twice	off	off	No or insignificant battery voltage
	off	rapidly flashing for 10 s	off	The radio gateway can be reset in the delivery status (the internal configuration is deleted)
Configuration mode	shortly flashing 1x	off	off	The button has been briefly pushed, or the reed contact has been briefly actuated with a magnet
	off	shortly flashing 1x	off	Button is released after it has been held down for longer
	slowly flashing	slowly flashing	off	Channel search
	off	slowly flashing	off	Channel found
	slowly flashing	off	off	No free channel found
	rapidly flashing	rapidly flashing	off	Registration of another radio detector on the gateway
	off	rapidly flashing for 3 s	off	Radio detector has been registered on the gateway
	rapidly flashing	off	off	The radio detector could not be registered on the gateway (30 radio detectors have already been registered)
	off	off	slowly flashing	The radio gateway is ready for the logging-off of a radio detector
	off	slowly flashing	slowly flashing	A radio detector has been recognized for logging-off (Note: The radio detector can be logged off with the button)
	rapidly flashing	off	rapidly flashing	Several radio detectors have been recognized for logging-off (Note: RadioSpy must be used to log off radio detectors)

Tab. 1 Status of the radio gateway

Legend

LEDs: slowly flashing 1x / second
 rapidly flashing 4x / seconds
 flashing twice 1x double / second
 shortly flashing 1x approx. 0.3 seconds

Button: press shortly <1...2 seconds
 keep pressed >3 seconds

see also:

→ 8.6 Resetting the radio gateway in delivery condition, Page 38

5.8 Status indication on the radio detector DOW1171/SMF6120

The radio detectors DOW1171 and SMF6120 have a status indicator.
In configuration mode the status indicator uses flashing sequences to indicate the field strength.

This table lists all possible status indications:

Flashing sequence of status indicator (red LED) / s (second)	Meaning of the flashing sequence
off	Normal operation
1x/s	ALARM (AI only with DOW1171)
1x / 2 s	New registration
3x / 2 s	Repeated registration
1x long / 2 s	System search: Tries to establish a radio connection with a radio gateway
4x / s*	Field strength after successful registration of the radio detector on the radio gateway: – Reception field strength high
3x / s*	Field strength after successful registration of the radio detector on the radio gateway: – Reception field strength medium
2x / s	Field strength after successful registration of the radio detector on the radio gateway: – Reception field strength low
1x/s	Field strength after successful registration of the radio detector on the radio gateway: – Reception field strength very low
Permanently flashing (5x / s)	Error

Tab. 2 Status of the radio detectors DOW1171 and SMF6120

* Acceptable connection qualities with the radio gateway are exclusively those field strengths indicated with a flashing sequence of 3x/s or 4x/s.

5.9 Parameter sets of the radio smoke detector DOW1171

The alarm activation sensitivity for radio smoke detectors DOW1171 can be set for each detector point.

The table below lists the possible parameter sets and the average reaction times with test gas:

Parameter set no.	Parameter set name	Average reaction time with test gas [s]
1 (Default)	No verification Test, applications that are not prone to deceptive phenomena	15
2	Short verification period	60
3	Medium verification period	85
4	Maximum verification period	105
5	Maximum verification period, additionally with strong filter	105

5.10 Power supply

Power supply of the radio gateway is normally ensured via the FDnet detector line. Short-term power failures (< 5 hours) on the detector line can be bridged by the 9V battery.

6 Project engineering

When planning a project, proceed as follows:

- Measure the radio wave propagation (field strength measurement) in the building with a suitable radio test set.
- Plan the subdivision of the radio coverage area in different radio cells.

This information is required to plan the number and positioning of the radio gateways.

Please adhere to the provisions in the applicable standards (e.g. fire sectors according to EN54, local provisions, etc.) A radio gateway always corresponds to a stub line.

see also:

- 6.4 Radio test set, Page 29
- 6.3 Defining the place of installation, Page 29
- 6.2 Transmission field, Page 27

6.1 Application conditions



WARNING

Erroneous project planning of the operational conditions

- Alarm signal not transmitted
- Radio detection works insufficiently or not at all
- Faults do occur
- Perform a field strength measuring beforehand.
- Adhere to the operational conditions and the chapters Installation location and Transmission field.

The following operational conditions apply for the radio gateway:

- The radio gateway must be at any time easily accessible for the service personnel
 - Accessibility of operation elements (MC-Link connector, button, reed contact)
 - Battery replacement
- The range between the radio gateway and the radio detector must be born in mind (max. 40 m, depending on the field strength measuring)
- The building construction has an essential impact on the radio transmission range
 - Steel, concrete, thick or humid walls
- Transmission field attenuation and reflection
 - Doors must be closed during the field strength measuring:
 - Mirrors in the room have a negative impact on the attenuation

Restrictions

The following application may possibly be unsuited:

- Rooms with great attenuation of the transmission field, e.g. with metal grid partition walls or metal storage shelves.

see also:

- 6.3 Defining the place of installation, Page 29
- 6.2 Transmission field, Page 27

6.2 Transmission field

In free environmental conditions, the field strength decreases by $1/r^2$; i.e. with double distance the attenuation increases by 6 dB. In buildings this factor is, as a first approximation, $1/r^5$, i.e. with double distance the attenuation increases by approx. 16 to 17 dB.

The following table shows the correlation between the distance and attenuation in case of intervisibility in the building.

Distance [m]	40	30	25	20	15	10	5
Attenuation [dB]	90	83	79	74	67	57	40

Maximum values: Distance 40 m / Attenuation 90 dB

Table for the conversion to linear values

Attenuation factor	1	4	10	50	100	1000
Attenuation [dB]	0	6	10	17	20	30



The transmission field in the building is influenced by walls or obstacles. To be able to make a statement on the attenuation, construction elements such as walls, ceilings, etc. must be exactly analysed.

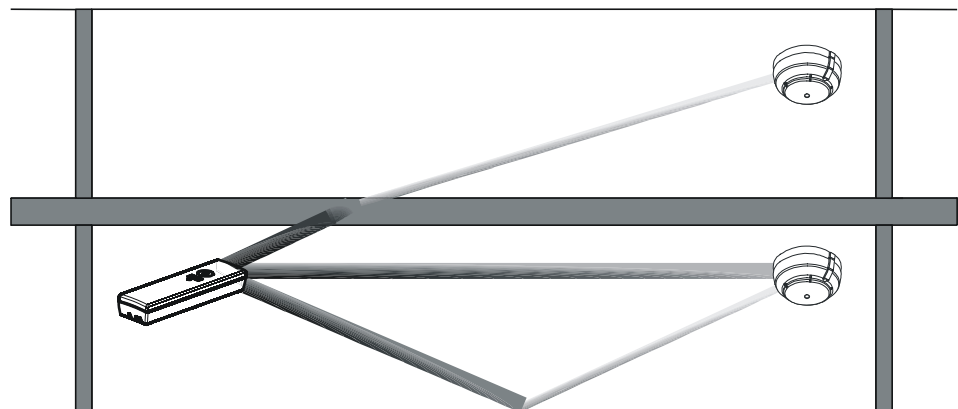


Fig. 8 Radio attenuation when penetrating obstacles

To determine the actual attenuation at the location of the receiver, the guide values of the construction elements along the radio transmission distance as listed in the table must be added.

Construction element	Additional attenuation
Partition	< 1 dB
dry bricks	approx. 6 dB
dry concrete	approx. 6 dB
Lime-sand brick	approx. 8 dB
Lime-sand brick plan elements	approx. 8 dB
Wooden wall construction	approx. 8 dB
Timber panel wall	approx. 8 dB
Humid bricks	approx. 10 dB
Coated plaster plate (double wall)	approx. 15 dB
Steel concrete	approx. 30 dB
Thick, wet brick wall	> 40 dB

Calculation example:

A radio gateway is mounted under a steel concrete ceiling. The separation walls are made from concrete.

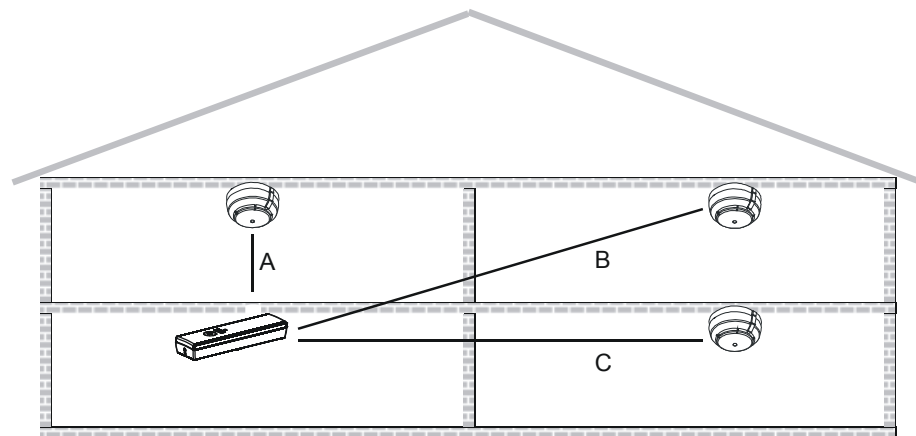


Fig. 9 Radio gateway with the transmission distances A, B, C

Distance A:	5 m	Free space + steel concrete ceiling	$\approx 40 + 30 = 70$ dB
Distance B:	15 m	Free space + steel concrete ceiling + concrete wall	$\approx 67 + 30 + 6 = 103$ dB
Distance C:	10 m	Free space + concrete wall	$\approx 57 + 6 = 63$ dB

Result:

- The distances A and C can be operated
- The radio detector on the distance B cannot be reached.

6.3 Defining the place of installation

General restrictions / system limitations

Maximum number of radio detectors per radio gateway	30
Maximum distance between radio gateway and radio detector	40 m or 90 dB



CAUTION

Several radio gateways use the same basis channel

→ Faults or malfunctions may occur.

- Commission the radio gateways one after the other in the same transmission field.

If you want to commission several radio gateways, these must be commissioned one after the other in the same transmission field, so that each radio gateway is able to determine its own basis channel in configuration mode and registered radio detectors each communicate with only one radio gateway.

Afterwards you may as well install the radio gateway in longer distances.

So you can ensure that even temporary changes of the radio detectors do not cause any malfunctions due to the occupancy of the same basis channels.



Measure the distances between the radio gateway and the radio detector on the building plan and calculate the attenuation.

For a safe project planning, it is necessary to measure the field strengths in the building.

More than 16 radio gateways

When a project comprises more than 16 radio gateway (max. exploitation), additional radio gateways (> 16) without radio cell overlapping must be installed in a transmission field.

This means that the 16 basis channels can again be used.

6.4 Radio test set

For a safe project planning, it is necessary to measure the field strengths in the building.

The field strength can be measured with the radio test set DZW1171.

Operating instructions 'Radio test set DZW1171': document no. 004446.

7 Installation

7.1 Installation and connection of the radio gateway

Prerequisite

The detector line must be switched off!



Install the radio gateway so that it is at any time easily accessible for battery exchange and for the operation elements MC-Link connector, button and reed contact.
Pay attention to a correct positioning, so that the LEDs are visible.



If the cable diameters of the in-/outputs exceed 1.5 mm^2 , auxiliary terminals must be used.
 • For cables with diameters of $1.5 \dots 2.5 \text{ mm}^2$ the connection terminal DBZ1190-AB can be used.
 • For larger diameters, a corresponding terminal must be provided by the customer. The terminal can be placed in the housing.

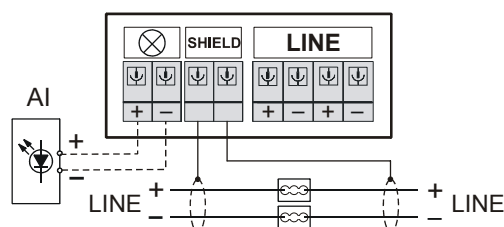


Fig. 10 Connection diagram with the detector line not yet connected
AI = External alarm indicator

Procedure:

1. Take the 2 labels with the serial number off the housing bottom. Attach one label onto or into the radio gateway, so that the radio gateway can still be identified when it has been fixed. The other label is intended for the building plan.
2. Break out the cable entries depending on the type of feed line mounting:
 - Flush-mounted feed lines: Break out the openings in the surface area of the housing bottom.
 - Surface-mounted feed lines: Break out the openings on the front side of the housing bottom.
3. Guide the cable through the housing bottom and mount the housing bottom with 2 screws (max. $\varnothing 4.3 \text{ mm}$) onto an even surface.
4. Prepare the wires of the detector line so that they can later be connected to the spring clip 'LINE'.
5. Connect the positive and negative poles of the detector line each with a microterminal or with a connection terminal (to be ordered separately). To be tested, the detector line must not be interrupted.
6. If the detector line cables are shielded, connect the shielding of the two detector line cables (incoming and outgoing) to the spring clips 'SHIELD'. To insert the wire, release the spring clip with a screwdriver. Connect only one wire to each spring clip! The shielding must not touch any extrinsic earthing potentials or metal parts in the device.

7. If the cable for the external alarm indicator is shielded, connect the shielding to a connection terminal (to be ordered separately) with the positive pole of the alarm indicator. The shielding must not touch any other potentials or metal parts in the device.
8. Attach the clip onto the contacts of the 9V battery and place the battery in the battery compartment of the housing bottom. Do not connect the battery cable to the connector on the p.c.b. until commissioning.
9. Let the housing cover snap in the housing bottom.

see also:

- 4.3 Connections, Page 13
- Fig. 2 , Page 11
- Fig. 3 , Page 12

8 Commissioning

Prior to the commissioning of the FDnet detector line, the radio cell of the radio gateway must be completely put in operation.

After that, the radio gateway is put in operation from the control panel. For more detailed information, please refer to the control unit documentation.

Conduct a performance check when commissioning is completed.

The configuration can be supported by the RadioSpy.



The flashing patterns of the LED and the required pressing duration (short/long) of the button are described in the chapter 'Status indication on the radio gateway'.

In general, it is possible to activate the reed contact instead of the button with a magnet upon commissioning.

Commissioning the radio cell

The following basic rules must be adhered to in order to commission a radio cell:

1. Putting the radio gateway into operation.
2. Register the radio detector at the radio gateway.
3. Commissioning the radio gateway on the detector line.

see also:

- 4.5.1 RadioSpy, Page 15
- 5.7 Status indication on the radio gateway, Page 22
- 8.2 Putting the radio gateway into operation, Page 33
- 8.3 Register the radio detector at the radio gateway, Page 34
- 8.4 Commissioning the radio gateway on the detector line, Page 36
- 8.1 Basic rules for commissioning, Page 32

8.1 Basic rules for commissioning

The following basic rules must be adhered to:

- A radio detector must be correctly registered at its radio gateway before another radio detector can be commissioned.
- A radio cell must be completely registered at its radio gateway before another radio cell can be commissioned.
Only one radio gateway must be in configuration mode.
- All radio cells must be completely commissioned before the detector line can be commissioned.

8.2 Putting the radio gateway into operation

Before radio detectors can be registered on the radio gateway, the radio gateway must be put in operation.



CAUTION

Several radio gateways use the same basis channel

- Radio detectors communicate with several radio gateways
- Faults or malfunctions may occur
- Commissioning the radio gateways one after the other in the same transmission field

If you want to commission several radio gateways, these must be commissioned one after the other in the same transmission field, so that each radio gateway is able to determine its own basis channel in configuration mode and registered radio detectors each communicate with only one radio gateway.

Afterwards you may as well install the radio gateway in longer distances.

So you can ensure that even temporary changes of the radio detectors do not cause any malfunctions due to the occupancy of the same basis channels.

Prerequisites:

- The FDnet detector line must be switched off.
- The radio gateway is in delivery condition.
- It is not allowed to commission several radio gateways simultaneously.

Procedure:

1. Unlock the housing cover of the radio gateway on the front side with pin and pull it off.
2. Insert a new battery.
 - The radio gateway changes from startup mode to the configuration mode for the basis channel.
 - The red and green LED are alternatingly flashing slowly.
 - The radio gateway looks for a free basis channel and signals the result
 - Channel found: green LED flashes slowly
 - No channel found: red LED flashes slowly
 - The radio gateway is ready for configuration mode



When the red LED flashes twice after inserting the battery, the battery voltage is too low.



If no basis channel is found, please consult the chapter 'Maintenance / Troubleshooting'.

see also:

- 8.3 Register the radio detector at the radio gateway, Page 34
- 8.6 Resetting the radio gateway in delivery condition, Page 38
- 9 Maintenance / Troubleshooting, Page 42
- Fig. 2 , Page 11
- Fig. 3 , Page 12

8.3 Register the radio detector at the radio gateway

Radio detectors can be registered on a radio gateway newly put in operation, or they can be added to the existing configuration of a radio cell.

In either case the button in the radio gateway must be briefly pressed to either change into configuration mode, either from the completed 'scan mode for the basis channel', or from normal operation.



The configuration can be supported by the RadioSpy.
As an alternative to the button, it is possible to activate the reed contact.

Prerequisites:

- The detector line FDnet is switched off.
- The radio gateway is in configuration mode.
 - LEDs green/red are alternatingly flashing rapidly.
- Number of registered radio detectors on the radio gateway < 30.
- The radio detector is in delivery condition.



If the radio detector is not in delivery condition, first put it in that condition as described in the chapter 'Resetting the DOW1171 in delivery condition' or 'Resetting the SMF6120 in delivery condition'.

Procedure:

1. Insert batteries in the radio detector and with the SMF6120 additionally press the alarm button.
2. Screw the DOW1171 into the base, or screw the manual call point SMF121 into the radio base SMF6120 and actuate the resetting slider for the alarm button.
 - The radio detector is automatically registered at the radio gateway.
 - Successful registration: green LED on the radio gateway flashes rapidly for 5 seconds
 - Registration failed: red LED on the radio gateway flashes rapidly and permanently
 - The radio gateway automatically changes into configuration mode again.
 - LEDs green/red are alternatingly flashing rapidly.

After the registration of the radio detector at the radio gateway, the status indicator (LED) of the radio detector indicates the field strength for 2 minutes as follows:

Flashing sequence / s (second)	Field strength
4x/s	high
3x/s	medium
2x/s	low
1x/s	very low



Note the serial number or registration sequence and location of the radio detector.

Acceptable connection qualities with the radio gateway are exclusively those field strengths indicated with a flashing sequence of 3x/s or 4x/s.

3. Repeat the process for all other radio detectors on the same radio gateway.
4. After the field strength flashing has stopped, the configuration mode of the radio gateway can be terminated by briefly pressing the button. The radio gateway is in normal operation and all LEDs are off.
 - After 15 minutes without manipulation the radio gateway automatically changes from configuration mode in normal operation.
 - When 30 radio detectors have been registered, the radio gateway automatically changes to normal operation.

see also:

- 8.7 Resetting the DOW1171 in delivery condition, Page 39
- 8.8 Resetting the SMF6120 in delivery condition, Page 40
- 4.5.1 RadioSpy, Page 15
- 5.6 Reed contact and button, Page 21
- Fig. 12 , Page 39
- Fig. 13 , Page 40
- Fig. 14 , Page 40

8.4 Commissioning the radio gateway on the detector line

After all radio detectors of a radio cell have been registered at the radio gateway in battery operation, the FDnet detector line can be commissioned.

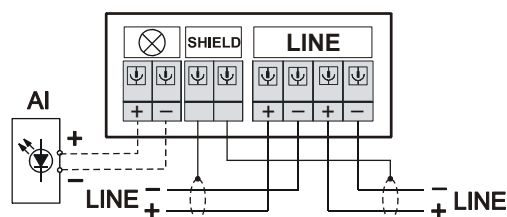


Fig. 11 Connection diagram FDnet detector line
AI = external alarm indicator

Procedure:

1. Connect the FDnet detector line cables to the spring clips 'LINE'.
2. Put the FDnet detector line in operation.

Instructions on the commissioning of the detector line can be found in the control panel documentation in account. For FS20, this is the document no. 009052.



Allocation of the detectors' serial numbers to FS20:

– the last 3 digits concur.

Example: serial number of the detector 80840349
ID on the FS20 control panel349



Topologically, the radio detectors registered on the radio gateway are in a stub.

The stub branches off the FDnet detector line between the FDCW221 and the integrated line separator FDCL221 of the radio gateway.

The registration sequence of the radio detectors determines the sequence on the stub.

see also:

→ 5.5.1 FDnet, Page 20

8.5 Logging off a radio detector at the radio gateway.

Registered radio detectors of a radio gateway can be logged off. This is possible with or without RadioSpy.

The procedure without RadioSpy is described in the following.

Prerequisites:

- The radio gateway is in normal operation.
- The radio detector to be logged off is in normal operation.

Procedure:

1. Press the button in the radio gateway longer than 3 seconds:
 - Yellow LED is flashing slowly
2. Remove the radio detector DOW 1171 from the base, or remove the battery of the radio detector SMF6120.
 - The radio gateway recognizes the radio detector to be removed (with the SMF6120 this takes up to 2 minutes)
 - The yellow and green LED in the radio gateway are alternatingly flashing slowly
3. Press the button in the radio gateway longer than 3 seconds
 - The LEDs are off
 - The logout is confirmed
 - The radio detector is logged off and the radio gateway changes into normal operation (the DOW1171 signals the correct logout additionally by the permanent flashing of the status indicator)or

Cancelling the logout prior to the confirmation

- Briefly press the button in the radio gateway
 - The radio detector remains registered and the radio gateway changes into normal operation.



When radio detectors are defective, or when more than one radio detector is recognized for removal, the red and yellow LEDs are alternatingly flashing rapidly. In this case the RadioSpy must be used to log off.

see also:

- 4.5.1 RadioSpy, Page 15
- 5.7 Status indication on the radio gateway, Page 22

8.6 Resetting the radio gateway in delivery condition

The radio gateway is reset in delivery condition when the existing configuration shall be deleted. This is the case when e.g. the radio gateway shall occupy a different basis channel.



The radio gateway is reset in the delivery condition.
An existing configuration is deleted.

Prerequisite

The FDnet detector line must be switched off.

Procedure:

1. Unlock the housing cover of the radio gateway on the front side with pin and pull it off.
2. Pull off the battery connector for at minimum 10 seconds, than plug it in again.
 - Wait until the green LED flashes rapidly.
3. Briefly press the button in the radio gateway while the green LED is flashing.
 - The radio gateway is initialised and set into configuration mode. This is indicated by alternating, slow flashing of the red and green LEDs.
 - A free basis channel is automatically searched for and the result is indicated:
 - Channel found: green LED flashes slowly
 - No channel found: red LED flashes slowly
4. Register the radio detector at the radio gateway.

see also:

- 8.3 Register the radio detector at the radio gateway, Page 34

8.7 Resetting the DOW1171 in delivery condition



The radio smoke detector is reset in the delivery condition. All existing configurations are deleted.

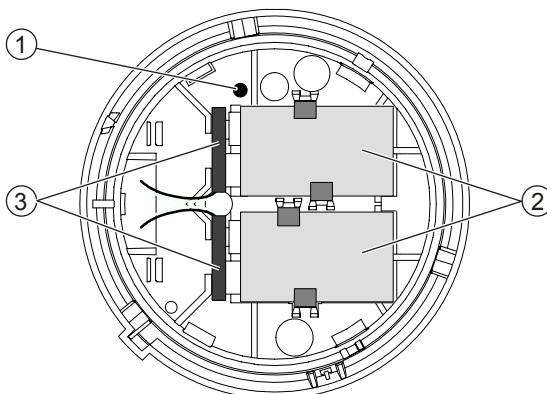


Fig. 12 Rear of the radio smoke detector DOW1171

Legend

- 1 Registration button 'New'
- 2 9V lithium batteries
- 3 Battery clips



The registration button 'New' (1) can be activated with a screwdriver size 0 or with a similar tool.

Procedure:

1. Unscrew the radio smoke detector DOW1171 from the base.
2. Remove the two batteries from the retainer and pull the clips off the battery contacts.
3. Wait for the discharge period of 10 seconds.
4. Attach the clips again on the two batteries and insert the batteries in the retainers.
 - The status indicator repeatedly flashes three times.
5. Press the registration button 'New' until the status indicator flashes only once.
 - The configuration data of the radio smoke detector DOW1171 is deleted.
 - The radio smoke detector is ready for registration at the radio gateway.

see also:

- 8.3 Register the radio detector at the radio gateway, Page 34

8.8 Resetting the SMF6120 in delivery condition



The manual call point with radio base SMF6120 is made up of the following parts:

- Manual call point SMF121 (upper part)
- Radio base SMF6120 (lower part)



The manual call point with radio base is reset in the delivery condition. All existing configurations are deleted.

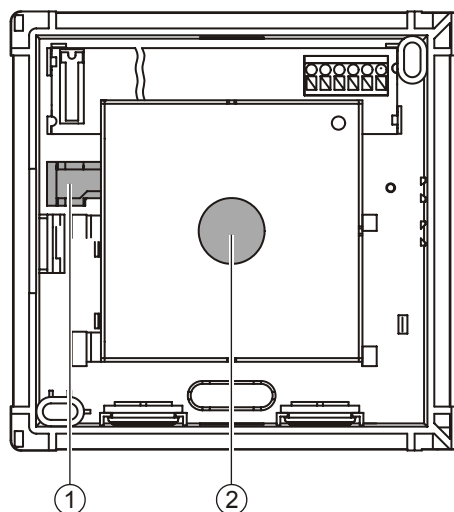


Fig. 13 Interior view of the manual call point SMF121

Legend

- 1 Resetting slider
- 2 Alarm button

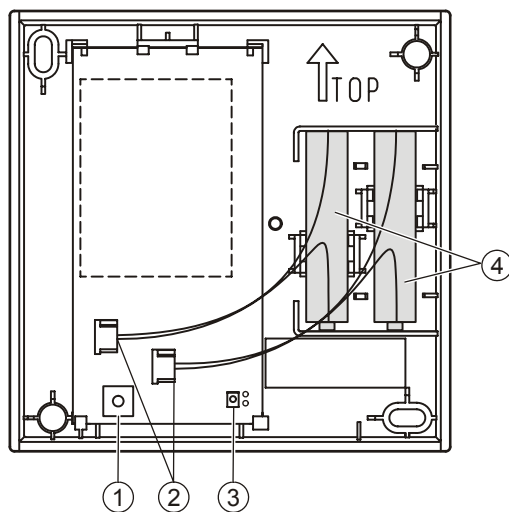


Fig. 14 Interior view of the radio base SMF6120

Legend

- 1 Registration button 'New'
- 2 Connectors of the batteries
- 3 Status indicator
- 4 3.6V lithium Mignon batteries

Procedure:

1. Unscrew the manual call point SMF121 from the radio base SMF6120.
2. Pull both connectors of the battery connection cables off the p.c.b. in the radio base.
3. Wait for the discharge period of 10 seconds.
4. Press the alarm button in the manual call point SMF121.
5. Insert both connectors of the battery connection cables in the p.c.b. in the radio base again.
 - The status indicator repeatedly flashes three times.
6. Press the registration button 'New' in the radio base until the status indicator flashes only once.
 - The configuration data of the manual call point with radio base SMF6120 is deleted.
 - The manual call point with radio base is ready for registration at the radio gateway.
7. Reset the alarm button with the resetting slider in the manual call point SMF121.

see also:

- 8.3 Register the radio detector at the radio gateway, Page 34

9 Maintenance / Troubleshooting

9.1 Battery replacement FDCW221

The battery of the radio gateway must be replaced when a battery fault for the radio gateway is indicated on the control panel. The detector line must not be switched off during a battery fault as otherwise the service life of the radio detector batteries is significantly reduced!

Prerequisites:

- The FDnet detector line must be switched on.
- The radio gateway must be in normal operation and must be fed without interruption by the FDnet detector line.
- The new battery is ready for insertion.



The battery must only be replaced by qualified personnel.

Procedure:

1. Unlock the housing cover of the radio gateway on the front side with pin and pull it off.
2. Replace the battery.
3. Let the housing cover of the radio gateway snap in the housing bottom again.



It may take up to 30 minutes until the battery fault message disappears on the control panel, as the battery is only checked every 30 minutes. The fault message only disappears when the voltage of the newly inserted battery is sufficient.

see also:

- Fig. 2 , Page 11
- Fig. 3 , Page 12
- 5.7 Status indication on the radio gateway, Page 22

9.2 Battery replacement DOW1171

The two batteries of the radio smoke detector must be replaced when a battery fault for the radio smoke detector is indicated on the control panel.



The batteries must only be replaced by qualified personnel.
Always replace both batteries.

Prerequisites:

- The FDnet detector line or the detector zone must be switched off.
- The radio gateway must be in normal operation.
- The new 9V batteries for the DOW1171 are ready for insertion.



Batteries of the radio smoke detectors must be exchanged one after the other.
Only one radio smoke detector of a radio cell may be without batteries at the same time, and only for a short period.

Procedure:

1. Unscrew the radio smoke detector DOW1171 from the base.
2. Remove the old batteries from the DOW1171.
3. Wait for the discharge period of 10 seconds.
4. Insert the new batteries in the DOW1171.
5. Insert the radio smoke detector DOW1171 in the base again.
 - The status indicator shows the field strength by flashing during 2 minutes.

For additional information, please consult the Technical documentation, chapter 'Commissioning', document no. 1787.

see also:

- 5.8 Status indication on the radio detector DOW1171/SMF6120, Page 24
- Fig. 12 , Page 39

9.3 Battery replacement SMF6120

The two batteries of the manual call point with radio base must be replaced when a battery fault for the manual call point with radio base is indicated on the control panel.



The batteries must only be replaced by qualified personnel.
Always replace both batteries.

Prerequisites:

- The FDnet detector line or the detector zone must be switched off.
- The radio gateway must be in normal operation.
- The new 3.6V batteries for the SMF6120 are ready for insertion.



Batteries of the manual call points with radio base must be exchanged one after the other.
Only one manual call point of a radio cell may be without batteries at the same time, and only for a short period.

Procedure:

1. Open the manual call point with radio base SMF6120
2. Remove the old batteries from the SMF6120.
3. Wait for the discharge period of 10 seconds.
4. Insert the new batteries in the SMF6120 and close the SMF6120 again.
 - The status indicator shows the field strength by flashing during 2 minutes.

For additional information, please consult the catalogue sheet SMF6120, document no. 007564,
order no. A24205-A337-A886.

see also:

- 5.8 Status indication on the radio detector DOW1171/SMF6120, Page 24
- Fig. 14 , Page 40

9.4 Status retrieval

The radio gateway is provided with the MC-Link (Maintenance and Commissioning Link). With the detector exchanger and tester FDUD29x (from SW V2.1), the following data can be polled with this link:

- Status of the external alarm indicator output
- Inadmissible configuration
- Status of the radio connections
- Error list
- Status register

9.5 Performance check

Conduct annual performance checks. During the function check, the radio gateway is checked for mechanical damage. Exchange defective radio gateways. For more detailed information, please refer to the control unit documentation.

Except for battery replacement, no special maintenance is required.

9.6 Troubleshooting

The following problems may occur:

In configuration mode, the registration of the radio detector is not possible

30 radio detectors have already been registered on the radio gateway. The radio gateway may still be put in configuration mode with a 31st radio detector; however, it is no longer possible to register that radio detector.

Remedy:

Insert another radio gateway.

The control panel does not correctly indicate the fire detection topology, or only after 10 minutes

In the following cases it takes at maximum 10 minutes until the control panel indicates the fire detection topology again or until the data is synchronized:

- The radio gateway has been completely without power supply for some seconds; i.e. the FDnet detector line has been switched off or interrupted, and no battery voltage was available.
- You have updated the radio gateway firmware.
- The radio gateway has been replaced.

Remedy:

The first case can be prevented by replacing batteries only when the FDnet detector line is switched on.

Restart the FDnet detector line.

9.7 Exchange radio gateway

RadioSpy should be preferably used to exchange a radio gateway. This way, the configuration of all radio detectors can be adopted.



Take into account the pin assignment of the line cables when a radio gateway is exchanged. When the line cables are inverted, a topology error is the result.

Prerequisite

The FDnet detector line must be switched off.

Procedure when using RadioSpy:

1. For the required steps please consult the RadioSpy User Manual A24205-A337-H897.
2. The radio gateway automatically synchronizes its data with the radio detectors. Observe the complete process with RadioSpy or wait for 10 minutes until the data is completely synchronized.
3. Switch the FDnet detector line back on.
4. Select 'Accept replaced devices' on the control panel.

Procedure without RadioSpy

The radio gateway must be completely reconfigured after the replacement.

see also:

→ 8.2 Putting the radio gateway into operation, Page 33

9.8 Exchange radio detectors

The items 2 to 4 listed below, regarding the replacement of a radio detector, can be found in the chapter in account.

Procedure:

1. Switch the FDnet detector line off.
2. Log the existing radio detector off the radio gateway.
3. Replace the radio detector.
4. Register the new radio detector at the radio gateway.
5. Switch the FDnet detector line back on.
6. Select 'Accept replaced devices' on the control panel.



Replace only one radio detector at once.

see also:

- 8.3 Register the radio detector at the radio gateway, Page 34
- 8.5 Logging off a radio detector at the radio gateway., Page 37

10 Specifications

10.1 Technical data

Detector line	Operating voltage	12 ... 33 VDC
	Operating current	typ. 1 mA
	Maximum current connection factor	$5 + n \cdot 1$ (n = number of radio detectors)
	Quiescent current connection factor	$4 + n \cdot 1$ (n = number of radio detectors)
	Address connection factor	$2 + n \cdot 1$ (n = number of radio detectors)
	Separator connector factor	1
	Log	FDnet
	Design	<ul style="list-style-type: none"> – short-circuit-proof – reverse battery-proof – voltage surge protected
	Compatibility	See doc. no. 008331 'List of compatibility'
Line separator	Line voltage:	
	– nominal	32 VDC (= V_{nom})
	– minimum	12 VDC (= V_{min})
	– maximum	33 VDC (= V_{max})
	Voltage at which the separator opens:	
	– minimum	7.5 VDC (= $V_{SO min}$)
	– maximum	10.5 VDC (= $V_{SO max}$)
	Permanent current when switches are closed	max. 0.5 A (= $I_{C max}$)
	Switching current (e.g. in case of short circuit)	max. 1 A (= $I_{S max}$)
	Leakage current when switches are open	max. 1 mA (= $I_{L max}$)
Radio	Serial impedance when switches are closed	max. 0.5 Ω (= $Z_{C max}$)
	Number of radio gateways with overlapping radio cells	max. 16
	Number of radio detectors per radio gateway	max. 30
	Emission/reception antennas	2 (antenna diversity)
	Radio transmission:	
	– Frequency range	868 ... 870 MHz, SRD band (Short Range Device)
	– Channel grid	25 kHz
	– Number of channels	80
	– Transmission performance	<5 mW ERP
	– Range:	
	– in buildings	max. 40 m
	– outdoors	max. 200 m
	– Attenuation	max. 90 dB

External alarm indicator	connectable ext. AI	2
	Power	9 ... 15 mA
	Voltage	6 ... 17 VDC
	Length of line	– max. 30 m with unshielded cables (recommended), or when the shielding is connected to the positive pole of the AI on the detector base
		– max. 5 m, if the shielding is connected with the earth
	Flashing interval times light / dark	32 ms / 1 s
Battery	Number of batteries	1
	Voltage	9 VDC
	Type	Block / 6LR61
	Lithium:	
	– Capacity	1200 mAh
	– Service life	>5 years
	Battery voltage monitored	yes
Connections	Detector line and ext. AI:	
	– Design	Spring clips
	– Wire cross-section	0.2 ... 1.5 mm ²
	MC-Link	Plug-type connection
Environmental conditions	Operating temperature	-10 ... +55 °C
	Storage temperature	-30 ... +65 °C
	Air humidity	≤95 % rel.
	Protection category (EN60529/IEC529)	IP40
	Electromagnetic compatibility:	
	– 1 MHz ... 2 GHz	30 V/m
Mechanical data	Dimensions (L x W x H)	214 x 58 x 33 mm
	Weight without battery	0.190 kg
	Color	similar to RAL 9002 grey-white
	Material	PC Macrolon 9125
	Combustibility	UL94 V-1
Standards	Standards	EN54-17:2005
		EN54-18:2005
	Approvals	VdS G207043
	QS standards	– Siemens Standard SN 36350
		– ISO9001
		– ISO9004
	CE conformity mark	yes
		0786-CPD-20283

10.2 Dimensions

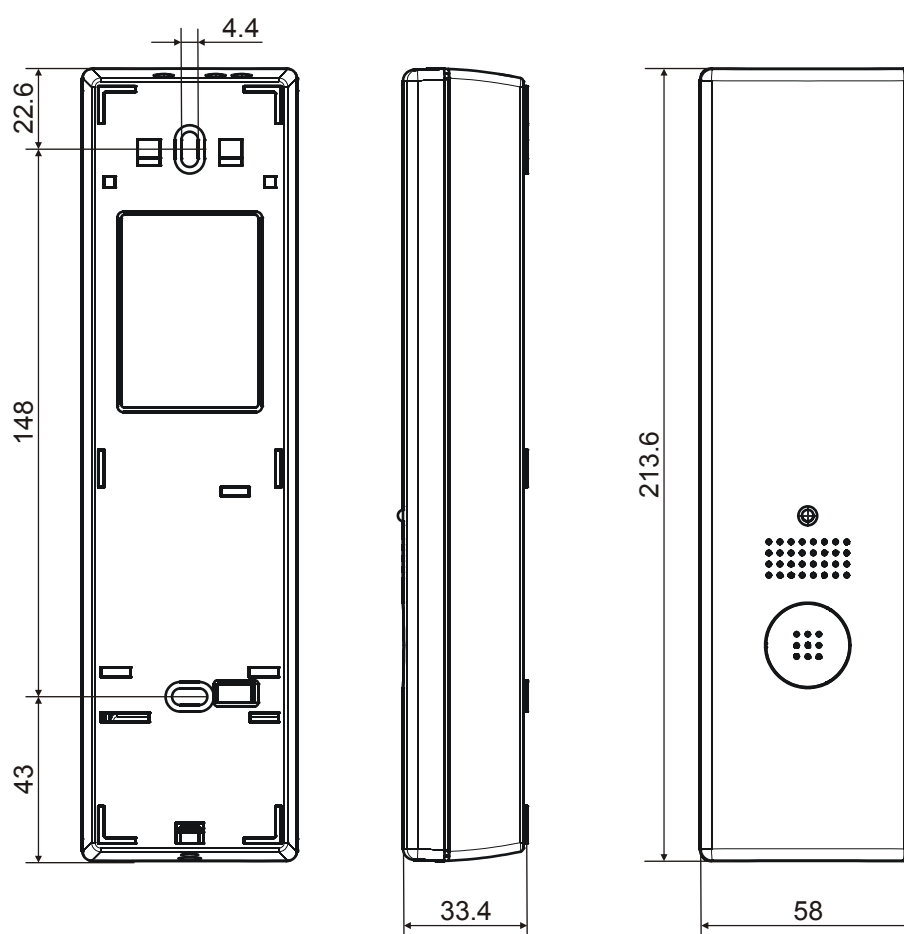


Fig. 15 Dimensions

10.3 Environmental compatibility

Electronic components and synthetic materials can be separated.
The plastic parts are marked and can be disposed of correspondingly.

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